Supporting agricultural transformation through Big Data solutions: experiences and lessons

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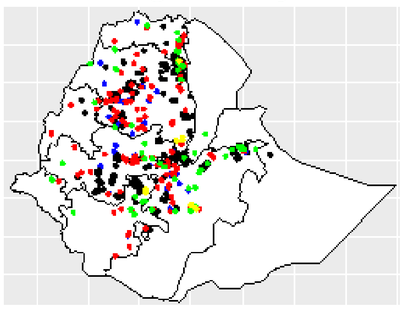
1. Introduction: Lack of site-specific fertilizer application is responsible for low agricultural yield in SSA. Low productivity is even worse in Ethiopia due to complex social-ecological system. Lack of site-specific fertilizer input and good agronomy practices also undermine overall system productivity in the country. Embracing agriculture with digital solutions can facilitate agricultural transformation through data-based informed decision making. We employ Big Data analytics to develop site- and context targeting of technologies across space.

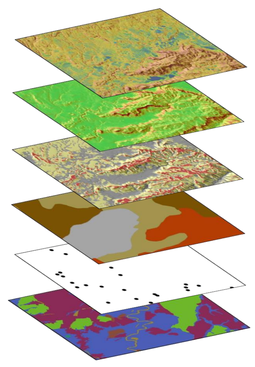
Objective: Develop methodological approach to assess the spatio-temporal dynamics of crop yield response to fertilizer application and develop agricultural technology recommendation domain considering relevant environmental conditions and variables. The aim is to develop optimal site-specific fertilizer application and ag technologies within corresponding recommendation units.

2. Core activities: *Collate available soil/agronomic data – environmental covariates- Big Data analysis – Web-GIS (DSS).*

1. Soils/agronomy database



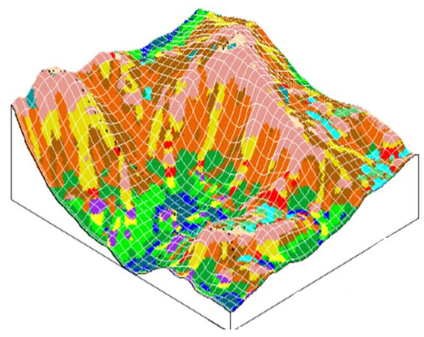
2. Environmental covariates



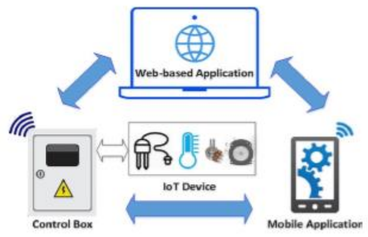
- Topography
- Geomorphology
- Geology
- Climate
- Soils

3. Data mining/analytics

4. Recommendation domain

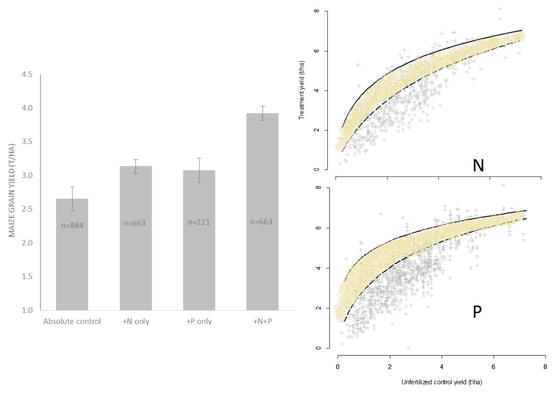


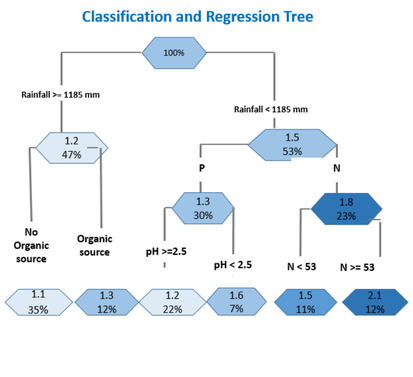
4. Web-GIS (DSS)



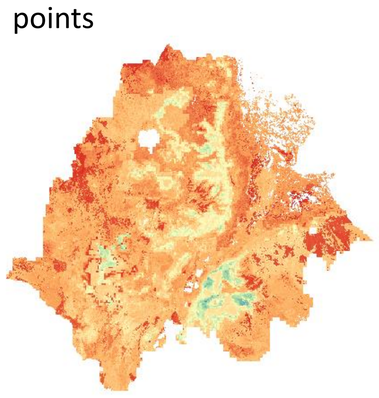
3. Key achievements

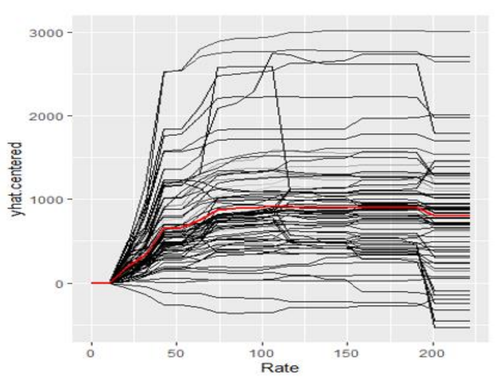
- Basic data mining and pattern recognition



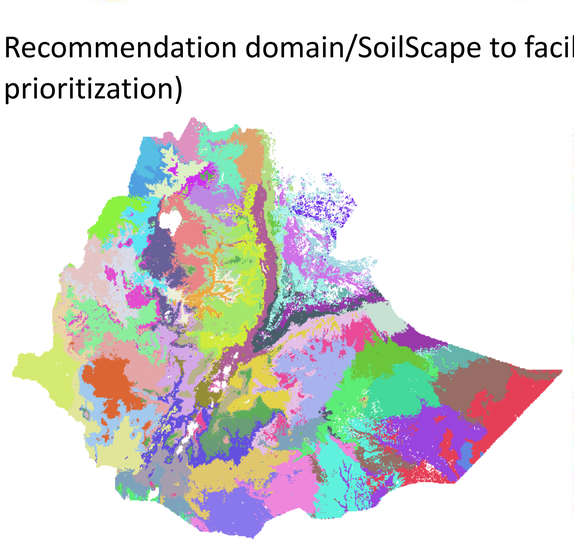


- Wheat yield prediction and response to fertilizer (N rate) curve at validation points



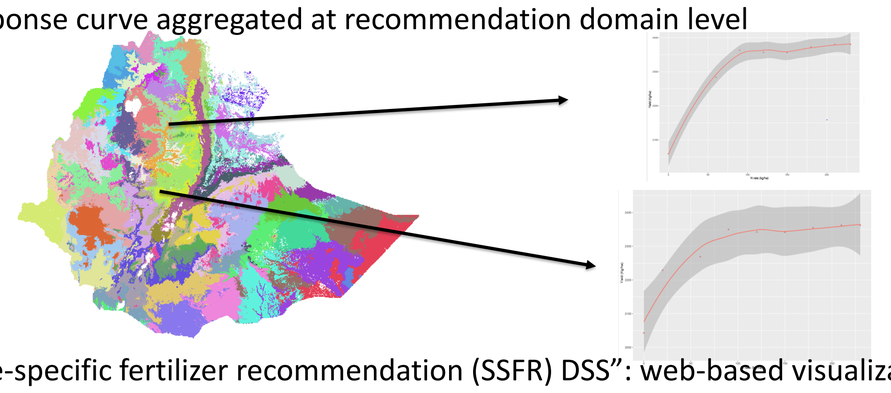


- Recommendation domain/SoilScape to facilitate targeting and scaling (investment prioritization)

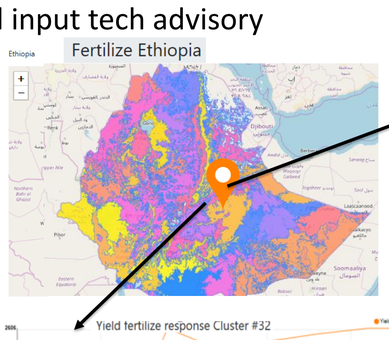


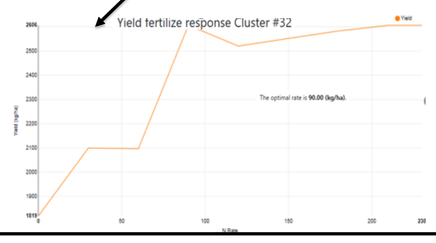
- Ethiopia is complex and heterogeneous. AEZ based advisory can't work.
- We also can't prescribe advisories to each farmer.
- This recommendation domains!

- Use case of recommendation domain for fertilizer application optimization: Fertilizer response curve aggregated at recommendation domain level



- "Site-specific fertilizer recommendation (SSFR) DSS": web-based visualization tool for agricultural input tech advisory





Enviromentals variables

ID	#32
Alt	919.4
Precip	461.0
Tmean	25.7
AET	446.6
Sm	13.9
Sm_CV	45.7
Srad	214.4
Srad_CV	11.9
Precip_CV	136.3
Temp_CV	6.4
Clay	35.9
SOC	20.4
pH	7.4
BD	26.9
Silt	32
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4. Integration and Links with National R&D

- MOA (ATA/GTP/EARCS/)
- NGO (CGs, CASCAPE, OFRA, IFDC, GIZ)

5. Bottlenecks/challenges

- Data not standardized
- Lack of data sharing policy implementation
- Limited capacity

6. Way forward

- More data, more testing, fine tuning and improve
- Conduct validation workshop
- Coupling

Agroclimate advisory service

Site-Specific Fertilizer Recommendation

Good Agronomic Practices

Site- and Context-Specific Decision Support System

Socio-Economic Typology

- Deploy the DSS (Web-GIS)
- Develop dissemination platform (web-GIS/apps etc)
- Capacity building and training
- Investment planning and targeting tools